

Sputum smear grading and treatment outcome among directly observed treatment-short course patients of tuberculosis unit, Jagdalpur, Bastar

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ABSTRACT

Introduction: Tuberculosis (TB) is a major global health problem. In 2014, worldwide, 1.5 million deaths were reported from TB. The study was planned to assess sputum smear grading and treatment outcome among TB patients attending tuberculosis unit (TU), Jagdalpur of Bastar district in Chhattisgarh. **Materials and Methods:** It was a record-based analysis for the year 2014 data from TU, Jagdalpur, Bastar of Chhattisgarh. **Statistical Analysis Used:** Data entry and analysis were done using STATA/SE 14.1 software. **Results:** Out of total registered 496 TB patients in 2014, 207 were sputum smear positive with 83 (40.1%) having 3+ and 14 (6.8%) having scanty sputum grading. The percentage of successfully treated was lowest, 71.4% in scanty followed by 1+ (80.2%), compared to 84.1% in sputum smear negative ($P = 0.02335$). Overall rate of unfavorable outcome was 16.9%. Factors associated with unfavorable outcome were age more than 40 years ($P = 0.01894$), male gender ($P = 0.06722$), and retreatment cases ($P = 0.0001136$). Death rate was higher (6.6%) among patients of Category II. Higher default rate in new smear positive (8.3%), new smear negative (7.8%), and retreatment (16.7%) was noted. **Conclusions:** Overall rate of unfavorable outcome was higher in patients with scanty and 1+ sputum grading. Age more than 40 years, male sex, and retreatment category were factors associated with unfavorable outcome.

Keywords: Bastar, sputum smear grading, treatment outcome, tuberculosis unit

Introduction

The year 2015 is a watershed moment in the battle against tuberculosis (TB). It marks the deadline for global TB targets set in the context of the millennium development goals (MDGs) and is a year of transitions: from the MDGs to a new era of sustainable development goals and from the stop TB strategy to the end TB strategy.

The advances are major: TB mortality had fallen 47% since 1990, with nearly all of that improvement taking place since 2000, when the MDGs were set.^[1]

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Despite these advances and despite the fact that nearly all cases can be cured, TB remains one of the world's biggest threats. In 2014, TB killed 1.5 million people. The toll comprised 890,000 men, 480,000 women, and 140,000 children. TB now ranks alongside HIV as a leading cause of death worldwide. India, Indonesia, and China had the largest number of cases: 23%, 10%, and 10% of the global total, respectively. Definition of died as treatment outcome in TB is "a TB patient who died from any cause during treatment."^[1]

India is the highest TB burden country accounting for more than one-fifth of the global burden of TB. To tackle this problem, Revised National Tuberculosis Control Programme (RNTCP) based on the directly observed treatment short course (DOTS)

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strategy has been made available in the entire country in March 2006. RNTCP has achieved improved cure rates and a success rate of 88% among new smear-positive cases was reported in 2011.^[2]

In 2014, in Chhattisgarh, total population covered by RNTCP was 270 lakhs; 154,163 TB suspects were examined; 14,808 smear-positive TB patients were diagnosed; 28,824 TB patients were registered for treatment; default rates were 33% among NSP cases, 18% among new smear-negative (NSN) cases, 2% among new extrapulmonary cases, 13% among relapse cases, 12% among treatment failure cases, and 20% among treatment after default cases.^[3] The unfavorable outcomes under the RNTCP are death, default, and failures. In 2013, death rate, default rate, and failure rate among new smear-positive cases were reported as 4%, 6%, and 2%, respectively. In Bastar, total population covered by RNTCP was 8.5 lakhs; 4875 TB suspects were examined; 765 smear-positive TB patients were diagnosed; total patient registered for treatment were 1204; 79% among new smear-positive cases.^[2]

The sputum smears are graded according to the number of bacilli seen in the slide as recommended by the WHO. It is of interest to find out whether patients with higher grading fare differently, as judged by treatment results, compared to those who have lower sputum smear grading. The number of bacilli seen in a smear reflects disease severity and patient infectivity.^[3]

Our objectives were retrospective record analysis to assess the importance of initial sputum grading as a predictor of treatment outcome. The aim of the present study was to assess the treatment outcome of TB patients and various factors associated with treatment outcome of TB patients put on DOTS.

Materials and Methods

The District TB Center, Jagdalpur, Bastar, Chhattisgarh, covers approximately 1,413,199 people. There were six tuberculosis units (TUs) in District Bastar (Bastar, Bakawand, Darbha, Jagdalpur, Lohandiguda, and Tokapal) and these six TUs consist of 18 designated microscopy centers (DMCs).

TU, Jagdalpur, has population of 125,463, of which 63,989 are males while 61,474 are females.^[4] TU, Jagdalpur, has five DMCs as Maharani Hospital Jagdalpur, DTC Jagdalpur, MPM Jagdalpur, Nangur DMC, and Nagarnar DMC.

The present study was a record-based analysis of TB register for the year 2014 data from TU, Jagdalpur, at Maharani Hospital Jagdalpur, Bastar, Chhattisgarh. Permission was obtained from District TB Officer, District TB Center, for the record-based study of the concerned TU.

Statistical analysis

Data entry was done in Excel and analyzed by STATA/SE 14.1 software (Stata Corp LLC, Texas, USA).

Results

Out of 496 TB patients registered during 2014, males were 322 (64.9%) and females were 174 (35.1%). Two hundred and ninety-nine (60.3%) were in age group of more than 40 years and 197 (39.7%) had age <40 years.

Sputum smear grading status and treatment outcome among TB patients are summarized in Table 1.

It was observed that the percentage of treatment success was higher among females (86.8%), age <40 years (88.0%), Category I cases (86.3%), and NSN TB cases (88.3%) [Table 2].

Table 3 describes that out of total 496 TB cases, pulmonary cases were 367 (74.0%) and female patients were 174 (35.1%), as compared to extrapulmonary and male cases. ($P = 0.000$).

Treatment outcome of retreatment cases and HIV-positive cases is shown in Figure 1.

Discussion

As far as sputum grading and treatment outcome is concerned, the percentage of successfully treated was lowest, 10 (71.4%) in scanty followed by 1+, 65 (80.2%), which is lower than that reported by Rajpal *et al.*^[5] However, the unexpected finding of favorable outcome in our study, 71 (85.5%) is comparable to the findings of Rajpal *et al.*,^[5] 85% treatment success rate in 3+sputum smear grading. It may be noted that the rate of default was also higher (12.7%) in 3+patients as compared to the 8.6% in 2+and 9.1% in 1+, similar to Rajpal *et al.*^[5]

In the present study, higher proportions of males were affected by TB as compared with females; also, more number of pulmonary TB cases, i.e., 367 (74.0%); similar results were seen in the study carried out at Paithan, Aurangabad, and Howrah district in India.^[6,7] In the present study, the percentage of defaulters in age above 40 was 14.7%; similar findings noted that as age advanced, percentage of defaulters was found to be increased.^[6,8] Poor outcome in patients older than 40 years of age as compared to those with <40 years was noted by Gebretsadik Berhe in a study conducted in Northern Ethiopia.^[8] Death rate was higher in male patients. This may be due to high default rate in male (10.9%)

Table 1: Distribution of all tuberculosis patients and treatment outcome as per sputum grading status

Sputum grading	Treatment outcome		Total, n (%)
	Favorable*, n (%)	Unfavorable**, n (%)	
0	243 (84.1)	46 (15.9)	289 (58.27)
Scanty	10 (71.4)	4 (28.6)	14 (2.82)
1+	65 (80.2)	16 (19.8)	81 (16.33)
2+	23 (79.3)	6 (20.7)	29 (5.85)
3+	71 (85.5)	12 (20.7)	83 (16.73)
Total	412 (83.06)	84 (16.94)	496 (100.00)

*Favorable treatment outcome=cured+treatment completed, **Unfavorable treatment outcome=died+failure+defaulter+transfer out

Table 2: Treatment outcome of tuberculosis patients according to age, sex, and category

Variables	Treatment outcome					P ^a
	Treatment success ^b , n (%)	Defaulter, n (%)	Died, n (%)	Failure, n (%)	Transfer out, n (%)	
Age						
<40	263 (88.0)	20 (6.7)	12 (4.0)	2 (0.7)	2 (0.7)	299 (60.3)
>40	149 (75.6)	29 (14.7)	9 (4.6)	2 (1.0)	9 (4.1)	197 (39.7)
Sex						
Female	151 (86.8)	14 (8.0)	5 (2.9)	4 (2.3)	0 (0.0)	174 (35.1)
Male	261 (81.1)	35 (10.9)	16 (5.0)	0 (0.0)	10 (3.1)	322 (64.9)
Category						
I	335 (86.3)	31 (8.0)	14 (3.6)	3 (0.8)	5 (1.3)	388 (100.0)
II	77 (71.3)	18 (23.4)	7 (9.1)	1 (1.3)	5 (6.5)	108 (100.0)
TB cases						
New smear positive	131 (83.4)	13 (8.3)	8 (5.1)	3 (1.9)	1 (0.6)	157
New smear negative	204 (88.3)	18 (7.8)	6 (2.6)	0 (0.0)	4 (1.7)	231
Retreatment cases	77 (71.3)	18 (16.7)	7 (6.5)	1 (0.9)	5 (4.7)	108

^aTreatment success for Category I is cured+treatment completed, ^bTreatment success versus unfavorable treatment outcome. TB: Tuberculosis

Table 3: Sex wise distribution of pulmonary and extrapulmonary patients of tuberculosis

Sex	Extrapulmonary, n (%)	Pulmonary, n (%)	Total, n (%)
Female	62 (48.1)	112 (30.5)	174 (35.1)
Male	67 (51.9)	255 (69.5)	322 (64.9)
Total	129 (26.0)	367 (74.0)	496 (100.00)

P=0.0001643

as compared to female (8.0%). Same findings were noted by Karanjekar *et al.* and Atif *et al.*^[6,9]

In new smear-positive treatment, success (%) was 131 (83.4), which is lower than national average of 88%, and died 8 (5.1%) and default 13 (8.3%) were higher than national average of 4% and 6%, respectively, and in NSN, default 18 (7.8%) was higher than national average of 6%.^[2]

In retreatment cases, failure had higher died 2 (12.5%) and defaulter 3 (18.8%) as compared to 9% and 13% at national level. Similar high defaulters were noted by Karanjekar and Bisoi.^[6,7] When we try to compare our study findings with Chhattisgarh, we found 277% as treatment success in relapse (62% cured + 215% treatment completed) and 113% (79% cured + 34% treatment completed) as treatment success in new smear positive, which is serious concern regarding data, as this finding was only with Chhattisgarh.^[2]

In our study, out of 14 (2.8%) HIV-positive TB patients, 11 (78.57%) had treatment success, 2 (14.29%) died, and 1 (7.14%) defaulted similar to annual status report 2012.^[2]

Limitations

The limitations of the study include the retrospective analysis using routine records which are subject to information bias. Categorization of the patients and their treatment outcomes as

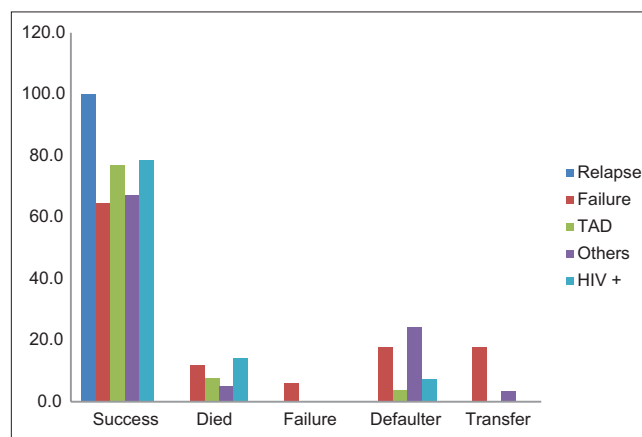


Figure 1: Treatment outcome of retreatment cases in Category II and HIV-positive cases

mentioned in the records were not independently validated; thus, misclassification may not have been identified.

Conclusions

Overall rate of unfavorable outcome was higher in patients with scanty and 1+sputum grading. Age more than 40 years, male sex, and retreatment category were factors associated with unfavorable outcome. Defaulters were higher in all categories of the patients in the present study.

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Conflicts of interest

There are no conflicts of interest.

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